

E 1.28. SOLAR/1012-78/11

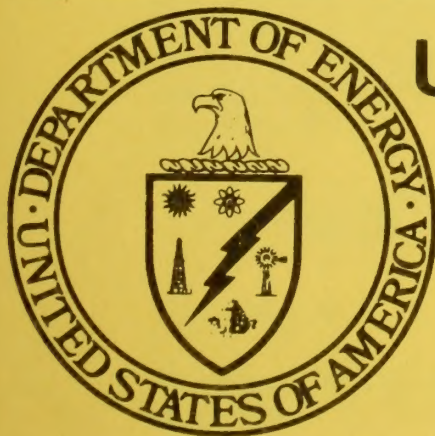
SOLAR/1012-78/11

Ataph 1214288

Monthly Performance Report

J. D. EVANS INC.
HOUSE A

NOVEMBER 1978



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

NOTICE

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MONTHLY PERFORMANCE REPORT

J. D. EVANS INC.
HOUSE A

NOVEMBER 1978

I. SYSTEM DESCRIPTION

The J. D. Evans House A is one of two instrumented single-family residences in Columbia, Maryland. The home has approximately 2,250 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 350 square feet. The array faces south at an angle of 45 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored in the basement in a 1,000-gallon steel storage tank. Incoming city water is preheated in a liquid-to-liquid heat exchanger located in the storage tank and then flows into a conventional 40-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat exchanger within a heat pump and an electrical heating element in the air-distribution duct provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has three modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the temperature difference between the storage tank and the collector outlet is greater than 15°F. Water circulates from the storage tank through the collector until a temperature difference of less than 5°F is reached.

Mode 2 - Storage-to-Space Heating: This mode activates when thermal energy for space heating is requested by the room thermostat. Solar heated water from storage circulates through a liquid-to-air heat exchanger in the space heating air duct. If the solar energy is insufficient to satisfy the space heating load requirements, the heat pump and/or the auxiliary electrical heating element will be activated. The electrical strip heater can also be manually operated without solar heating and heat pump operation.

Mode 3 - DHW Preheating: This mode is activated by drawing hot water from the system. Cold supply water is preheated in a liquid-to-liquid heat exchanger located in the solar energy storage tank before flowing to the DHW tank. If the required DHW tank temperature is not maintained by solar preheating, auxiliary energy is provided by the electrical heating element in the DHW tank.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in November, and the solar energy system operated continuously during the month. Solar energy satisfied 34 percent of the DHW requirements

● I001 COLLECTOR PLANE TOTAL INSOLATION
 ▼ T001 OUTDOOR TEMPERATURE

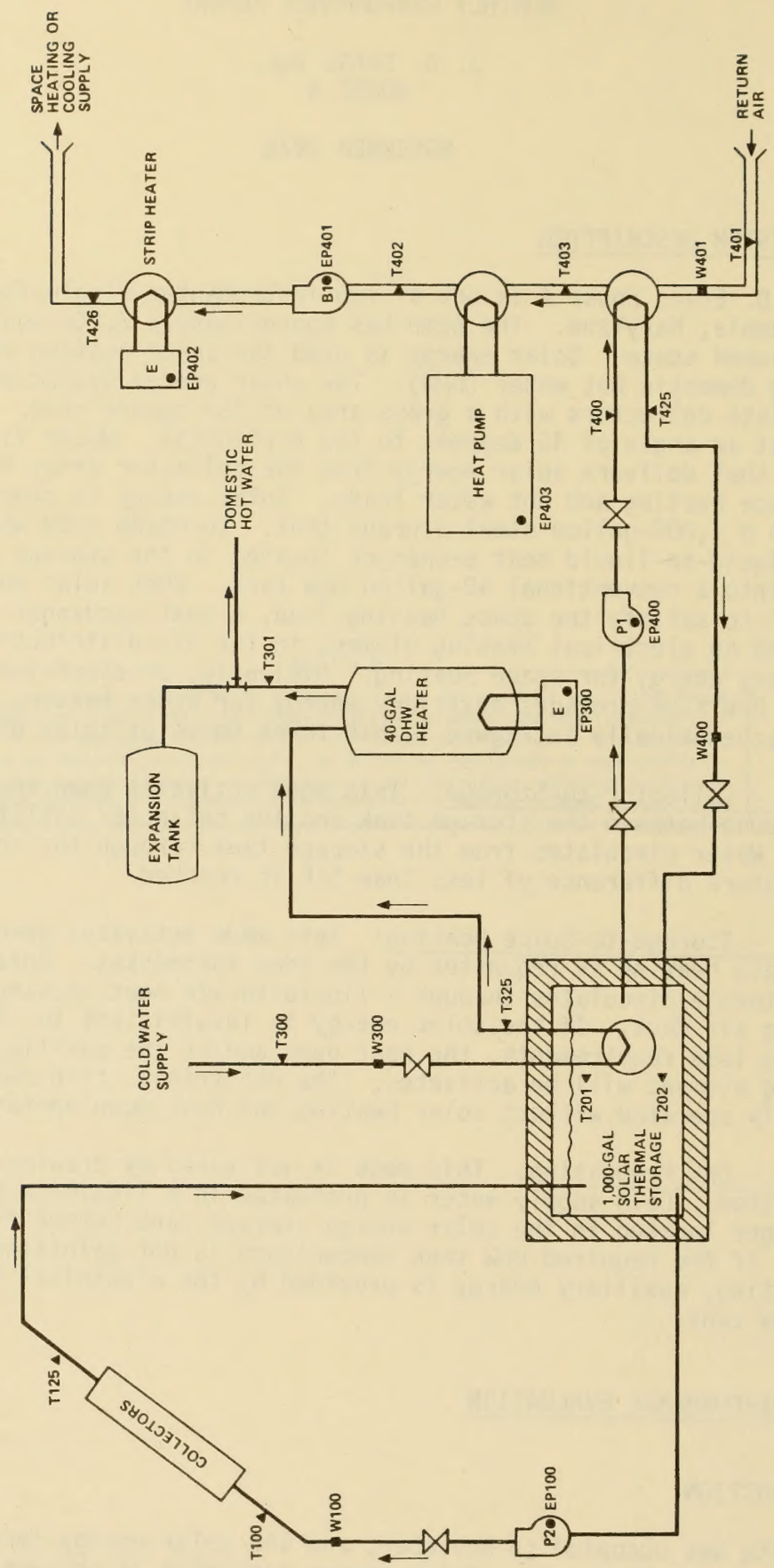


Figure 1. J. D. EVANS, INC., HOUSE A SOLAR ENERGY SYSTEM SCHEMATIC

and 20 percent of the space heating requirements. The solar energy system provided an electrical energy savings of 0.34 million Btu.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 8.8 million Btu for a daily average of 839 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during November of 1069 Btu per square foot for a south-facing plane with a tilt of 45 degrees to the horizontal. The average ambient temperature during November was 46°F, the same as the long-term average for November.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of November was 8.8 million Btu. During the period the collector loop was operating, the total insolation amounted to 5.2 million Btu. The total collected solar energy for the month of November was 2.0 million Btu, resulting in a collector array efficiency of 23 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 2.0 million Btu. Operational energy required by the collector loop was 0.090 million Btu.

Storage - Solar energy delivered to storage was 2.0 million Btu. There were 0.84 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 1.8 million Btu. This loss represented 87 percent of the energy delivered to storage. The storage efficiency was 13 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 133°F.

DHW Load - The DHW subsystem consumed 0.081 million Btu of solar energy and 0.27 million Btu of auxiliary electrical energy to satisfy a hot water load of 0.24 million Btu. The solar fraction of this load was 34 percent. Losses from the DHW subsystem were 0.11 million Btu. The DHW subsystem provided an electrical energy savings of 0.081 million Btu. A daily average of 12 gallons of DHW was consumed at an average temperature of 139°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.76 million Btu of solar energy and 1.4 million Btu of auxiliary electrical energy to satisfy a space heating load of 3.8 million Btu. The heat pump supplied 3.2 million Btu of energy. The solar fraction of the space heating load was 20 percent. The space heating subsystem consumed a total of 0.18 million Btu of operational energy, resulting in an electrical energy savings of 0.34 million Btu. The average ambient temperature inside the house was 68°F.

OBSERVATIONS

The combination of decreasing ambient temperature and low incident solar radiation during the month caused the storage temperature to decrease from

176°F on November 1 to 92°F on November 30. Both the DHW and the space heating subsystems seem to have been shut off for the first 16 days of the month; during this period there was no hot water usage and no space heating load. There had been appreciable thermal loss from storage in the 16 days when no energy was drawn from storage.

ENERGY SAVINGS

The solar energy system provided a total electrical energy savings of 0.34 million Btu. The DHW subsystem provided an electrical energy savings of 0.081 million Btu, while the space heating subsystem contributed an electrical energy savings of 0.34 million Btu.

III. ACTION STATUS

No immediate action is required at this time.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND
REPORT PERIOD: NOVEMBER, 1978

SOLAR/1012-78/11

SITE/SYSTEM DESCRIPTION:

THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE

AVERAGE BUILDING TEMPERATURE

ECSS SOLAR CONVERSION EFFICIENCY

ECSS OPERATING ENERGY

TOTAL SYSTEM OPERATING ENERGY

TOTAL ENERGY CONSUMED

8.812	MILLION BTU
25177	BTU/SQ. FT.
2.046	MILLION BTU
5845	BTU/SQ. FT.
46	DEGREES F
68	DEGREES F
0.09	MILLION BTU
0.090	MILLION BTU
0.264	MILLION BTU
3.958	MILLION BTU

SUB SYSTEM SUMMARY:

LCAD FRACTION USED
SOLAR ENERGY USED
OPERATING ENERGY
AUX. THERMAL ENERGY
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HEATING
3.830
20
0.755
0.175
0.964
1.377
N.A.
0.344
N.A.

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL	BTU
4.068	MILLION
21	PERCENT
0.837	MILLION BTU
0.264	MILLION BTU
1.235	MILLION BTU
1.648	MILLION BTU
N.A.	MILLION BTU
0.336	MILLION BTU
N.A.	MILLION BTU

SYSTEM PERFORMANCE FACTOR:

0.639

* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA

N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND
REPORT PERIOD: NOVEMBER, 1978

SOLAR/1012-78/11

SITE/SYSTEM DESCRIPTION:

THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY
9.297 GIGA JOULES
285914 KJ/SQ.M.
2.158 GIGA JOULES
66381 KJ/SQ.M.
8 DEGREES C
20
0.09 GIGA JOULES
0.095 GIGA JOULES
0.279 GIGA JOULES
4.176 GIGA JOULES

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE
AVERAGE BUILDING TEMPERATURE
ECSS SOLAR CONVERSION EFFICIENCY
ECSS OPERATING ENERGY
TOTAL SYSTEM OPERATING ENERGY
TOTAL ENERGY CONSUMED

SUBSYSTEM SUMMARY:

LOAD
SOLAR FRACTION USED
OPERATING ENERGY
AUX. THERMAL ENG
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HOT WATER
0.252
34
0.086
N.A.
0.286
0.286
N.A.
0.086
N.A.

HEATING
4.040
20
0.797
0.184
1.017
1.452
N.A.
0.363
N.A.

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL
4.292 GIGA JOULES
21 PERCENT
0.883 GIGA JOULES
0.279 GIGA JOULES
1.303 GIGA JOULES
1.739 GIGA JOULES
N.A. GIGA JOULES
0.354 GIGA JOULES
N.A. GIGA JOULES

SYSTEM PERFORMANCE FACTOR:

0.639

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: J. D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND

SOLAR/1012-78/11

REPORT PERIOD: NOVEMBER, 1978

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.653	50	NOT	NOT	0.006	NOT	0.000
2	0.703	46	APPL	APPL	0.006	APPL	0.001
3	0.608	53	ICAB	ICAB	0.004	ICAB	0.001
4	0.056	50	LE	LE	0.000		0.014
5	0.611	56			0.006		0.001
6	0.542	53			0.005		0.003
7	0.212	52			0.000		0.003
8	0.141	47			0.007		0.001
9	0.659	43			0.005		0.000
10	0.506	48			0.003		0.002
11	0.246	51			0.000		0.002
12	0.178	51			0.000		0.000
13	0.021	48			0.006		0.001
14	0.462	53			0.000		0.001
15	0.016	44			0.000		0.019
16	0.022	54			0.000		0.118
17	0.063	51			0.008		0.074
18	0.522	41			0.007		0.338
19	0.493	40			0.008		0.321
20	0.210	42			0.002		0.740
21	0.039	39			0.000		2.354
22	0.045	44			0.006		0.073
23	0.329	46			0.000		0.166
24	0.108	39			0.001		0.479
25	0.152	36			0.000		0.001
26	0.089	31			0.000		0.152
27	0.089	36			0.000		0.013
28	0.133	35			0.003		0.018
29	0.132	41			0.007		0.100
SUM	8.812	-	N.A.	N.A.	0.090	N.A.	-
AVG	0.294	46	N.A.	N.A.	0.003	N.A.	0.095
NBS ID	0001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.
 @ DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/11
REPORT PERIOD: NOVEMBER, 1978

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.653	0.415	0.143	61	0.219
2	0.703	0.471	0.167	59	0.238
3	0.608	0.304	0.124	64	0.204
4	0.056	0.000	0.000	54	0.000
5	0.611	0.404	0.183	68	0.299
6	0.542	0.320	0.111	66	0.206
7	0.212	0.000	0.000	*	0.000
8	0.141	0.000	0.000	51	0.000
9	0.659	0.474	0.198	56	0.300
10	0.509	0.300	0.114	60	0.223
11	0.246	0.113	0.037	59	0.151
12	0.178	0.000	0.000	59	0.000
13	0.021	0.000	0.000	48	0.000
14	0.481	0.325	0.100	63	0.208
15	0.046	0.000	0.000	*	0.000
16	0.022	0.000	0.000	43	0.000
17	0.016	0.000	0.000	52	0.000
18	0.643	0.553	0.253	60	0.393
19	0.522	0.398	0.164	49	0.315
20	0.493	0.402	0.174	48	0.353
21	0.210	0.076	0.035	49	0.165
22	0.039	0.000	0.000	40	0.000
23	0.045	0.000	0.000	45	0.000
24	0.329	0.267	0.120	52	0.363
25	0.108	0.000	0.000	39	0.000
26	0.152	0.030	0.002	39	0.010
27	0.019	0.000	0.000	32	0.000
28	0.089	0.000	0.000	38	0.000
29	0.133	0.064	0.014	40	0.104
30	0.327	0.275	0.108	47	0.331
SUM	8.812	5.191	2.046	-	-
AVG	0.294	0.173	0.068	51	0.232
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT STORAGE PERFORMANCE

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/11
REPORT PERIOD: NOVEMBER, 1978

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.143	0.000	0.026	176	0.186
2	0.167	0.001	0.024	179	0.148
3	0.124	0.000	-0.004	181	0.032
4	0.000	0.001	-0.066	177	-0.000
5	0.183	0.001	0.002	171	1.015
6	0.111	0.002	-0.001	172	0.000
7	0.000	0.001	-0.052	168	0.000
8	0.000	0.000	0.063	160	1.000
9	0.198	0.000	0.043	157	0.216
10	0.147	0.001	0.012	160	0.330
11	0.037	0.001	-0.050	154	-1.000
12	0.000	0.000	-0.038	154	1.000
13	0.000	0.000	-0.050	147	1.000
14	0.100	0.000	0.001	143	0.000
15	0.000	0.000	-0.030	142	1.000
16	0.000	0.000	-0.041	137	1.000
17	0.000	0.050	-0.103	131	0.000
18	0.000	0.048	-0.102	127	1.000
19	0.253	0.176	-0.076	121	0.597
20	0.164	0.158	-0.006	109	0.607
21	0.175	0.155	-0.020	92	0.792
22	0.000	0.093	-0.093	88	0.526
23	0.000	0.055	-0.055	93	0.000
24	0.000	0.052	-0.052	88	1.000
25	0.000	0.000	-0.041	87	1.000
26	0.002	0.003	-0.005	87	1.000
27	0.000	0.003	-0.005	86	1.000
28	0.000	0.001	-0.005	86	1.000
29	0.014	0.002	0.009	86	0.829
30	0.108	0.033	0.048	92	0.745
SUM	2.046	0.837	-0.581	-	-
AVG	0.068	0.028	-0.019	133	0.125
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT HOT WATER SUBSYSTEM

SITE: J. D. EVANS, INC., HOUSE A, COLUMBIA, MARYLAND
REPORT PERIOD: NOVEMBER, 1978

SOLAR/1012-78/11

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR. OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP. DEG F	HOT WAT. TEMP. DEG F	HOT WATER USED GAL
1	0.000	13	0.000	0.003	0.003	0.003	NOT APPLICABLE	0.000	0.000	52	100	0
2	0.000	5	0.000	0.005	0.005	0.005	NOT APPLICABLE	0.000	0.000	74	140	1
3	0.000	6	0.000	0.004	0.004	0.004	NOT APPLICABLE	0.000	0.000	74	140	1
4	0.000	8	0.000	0.002	0.002	0.002	NOT APPLICABLE	0.000	0.000	73	140	1
5	0.000	10	0.000	0.004	0.004	0.004	NOT APPLICABLE	0.000	0.000	73	139	1
6	0.000	11	0.000	0.004	0.004	0.004	NOT APPLICABLE	0.000	0.000	72	140	1
7	0.000	11	0.000	0.006	0.006	0.006	NOT APPLICABLE	0.000	0.000	72	139	1
8	0.000	11	0.000	0.005	0.005	0.005	NOT APPLICABLE	0.000	0.000	69	139	1
9	0.000	10	0.000	0.005	0.005	0.005	NOT APPLICABLE	0.000	0.000	70	140	1
10	0.000	10	0.000	0.005	0.005	0.005	NOT APPLICABLE	0.000	0.000	69	140	1
11	0.000	7	0.000	0.005	0.005	0.005	NOT APPLICABLE	0.000	0.000	69	140	1
12	0.000	6	0.000	0.006	0.006	0.006	NOT APPLICABLE	0.000	0.000	70	139	0
13	0.000	7	0.000	0.006	0.006	0.006	NOT APPLICABLE	0.000	0.000	68	140	0
14	0.000	6	0.000	0.012	0.012	0.012	NOT APPLICABLE	0.000	0.000	66	144	1
15	0.000	24	0.011	0.015	0.015	0.015	NOT APPLICABLE	0.000	0.000	63	144	1
16	0.000	47	0.011	0.015	0.015	0.015	NOT APPLICABLE	0.000	0.000	58	144	1
17	0.000	49	0.011	0.018	0.018	0.018	NOT APPLICABLE	0.000	0.000	62	142	1
18	0.000	32	0.001	0.023	0.023	0.023	NOT APPLICABLE	0.000	0.000	62	144	1
19	0.000	24	0.007	0.026	0.026	0.026	NOT APPLICABLE	0.000	0.000	62	140	1
20	0.000	05	0.016	0.028	0.028	0.028	NOT APPLICABLE	0.000	0.000	58	144	0
21	0.000	44	0.000	0.016	0.016	0.016	NOT APPLICABLE	0.000	0.000	60	144	1
22	0.000	31	0.001	0.010	0.010	0.010	NOT APPLICABLE	0.000	0.000	60	144	1
23	0.000	29	0.002	0.016	0.016	0.016	NOT APPLICABLE	0.000	0.000	57	144	1
24	0.000	16	0.001	0.005	0.005	0.005	NOT APPLICABLE	0.000	0.000	57	144	1
SUM	0.239	-	0.081	0.271	0.271	0.271	N.A.	0.081	N.A.	-	-	347
AVG	0.008	34	0.003	0.009	0.009	0.009	N.A.	0.003	N.A.	66	139	12
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND
 REPORT PERIOD: NOVEMBER, 1978
 SOLAR/1012-78/11

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR. OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	70	50
2	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	69	46
3	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	70	53
4	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	69	50
5	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	70	56
6	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	71	52
7	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	70	57
8	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	68	43
9	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	65	43
10	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	66	53
11	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	67	51
12	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	65	48
13	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	66	53
14	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	68	44
15	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	64	51
16	0.000	0	0.000	0.000	0.000	0.000	NOT APPLICABLE	0.000	0.000	71	44
17	0.049	100	0.037	0.009	0.000	0.000	NOT APPLICABLE	0.019	0.000	62	41
18	0.164	100	0.147	0.009	0.000	0.000	NOT APPLICABLE	0.080	0.000	71	41
19	0.142	100	0.142	0.009	0.000	0.000	NOT APPLICABLE	0.071	0.000	70	40
20	0.152	100	0.091	0.017	0.000	0.000	NOT APPLICABLE	0.072	0.000	69	34
21	0.091	33	0.000	0.011	0.058	0.082	NOT APPLICABLE	0.040	0.000	69	34
22	0.142	34	0.048	0.019	0.028	0.133	NOT APPLICABLE	0.019	0.000	69	46
23	0.140	11	0.036	0.015	0.093	0.133	NOT APPLICABLE	0.016	0.000	69	33
24	0.177	0	0.000	0.025	0.131	0.188	NOT APPLICABLE	0.000	0.000	68	33
25	0.535	0	0.000	0.017	0.137	0.271	NOT APPLICABLE	0.000	0.000	68	33
26	0.435	0	0.000	0.018	0.149	0.196	NOT APPLICABLE	0.000	0.000	68	31
27	0.466	10	0.000	0.014	0.085	0.213	NOT APPLICABLE	0.000	0.013	68	34
28	0.307	10	0.032	0.014	0.085	0.121	NOT APPLICABLE	0.013	0.013	68	34
29	0.307	10	0.032	0.014	0.085	0.121	NOT APPLICABLE	0.013	0.013	68	34
30	0.307	10	0.032	0.014	0.085	0.121	NOT APPLICABLE	0.013	0.013	68	34
SUM	3.830	-	0.755	0.175	0.964	1.377	N.A.	0.344	N.A.	-	-
AVG	0.128	20	0.025	0.006	0.032	0.046	N.A.	0.011	N.A.	68	46
NBS	Q4C2	N40C	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENVIRONMENTAL SUMMARY

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND
REPORT PERIOD: NOVEMBER, 1978

SOLAR/1012-78/11

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	1864	NOT	50	61	NOT	NOT	NOT
2	2008		46	59			
3	1736		53	64			
4	160		50	54			
5	1747		56	68			
6	1548		53	66			
7	1607		52	*			
8	4022		47	51			
9	1885		43	56			
10	1702		48	60			
11	507		51	59			
12	605		48	48			
13	131		58	63			
14	62		53	*			
15	467		44	43			
16	1839		51	52			
17	1490		54	60			
18	1408		41	49			
19	1600		40	48			
20	1129		42	49			
21	1941		39	45			
22	310		46	45			
23	434		39	52			
24	555		36	39			
25	255		31	32			
26	379		36	38			
27	933		35	40			
28			41	47			
29							
30							
SUM	25177	N.A.	-	-	-	-	-
AVG	839	N.A.	46	51	N.A.	N.A.	N.A.
NBS ID	Q001		N113			N115	N114

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT THERMODYNAMIC CONVERSION EQUIPMENT

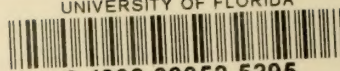
SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/11
REPORT PERIOD: NOVEMBER, 1978

DAY OF MONTH	EQUIPMENT LOAD MILLION BTU	THERMAL ENERGY INPUT MILLION BTU	OPERATING ENERGY MILLION BTU	ENERGY REJECTED MILLION BTU	COEFFICIENT OF PERFORMANCE (SEE NOTE)
1	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	0.000
2	0.000	0.000			0.000
3	0.000	0.000			0.000
4	0.000	0.000			0.000
5	0.000	0.000			0.000
6	0.000	0.000			0.000
7	0.000	0.000			0.000
8	0.000	0.000			0.000
9	0.000	0.000			0.000
10	0.000	0.000			0.000
11	0.000	0.000			0.000
12	0.000	0.000			0.000
13	0.000	0.000			0.000
14	0.000	0.000			0.000
15	0.000	0.000			0.000
16	0.000	0.000			0.000
17	0.000	0.000			0.000
18	0.000	0.000			0.000
19	0.000	0.000			0.000
20	0.000	0.000			0.000
21	0.000	0.000			0.000
22	0.190	0.082			0.000
23	0.314	0.133			0.000
24	0.095	0.039			0.000
25	0.304	0.133			0.000
26	0.418	0.188			0.000
27	0.577	0.271			0.000
28	0.435	0.196			0.000
29	0.466	0.213			0.000
30	0.276	0.121			0.000
SUM	3.075	1.377	*	*	0.000
AVG	0.102	0.046	*	*	0.000

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.
NOTE:



UNIVERSITY OF FLORIDA



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